

Specialisations in BMS programme

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Specialisation Medical Neuroscience

Who is organizing this? The Medical Neuroscience Specialisation in the BMS master is strongly embedded to the Donders Center for Medical Neuroscience (DCMN) and spans translational neuroscientific topics from fundamental to applied and clinical science. Experts from the DCMN have organized over 20 courses that span the medical neurosciences. Those can be associated to at least one of the fields within the specialization: Behavioural and Translational Neuroscience, Systems and Cognitive Neuroscience, and Molecular and Cellular Neuroscience.

What will you be able to study? The objective of the Medical Neuroscience specialization is to offer you in-depth training in the genetic, molecular, cellular, behavioral and systems-level neurosciences so you can have a significant impact on health care. Within the Radboud University, this specialization is positioned in between the more fundamentally oriented master specialisation Neurobiology in the Medical Biology master and the more cognition and neuroimaging oriented research master Cognitive Neuroscience. With its roots in the research themes and clinical practice of the Radboudumc and with its interdisciplinary translational approach to health care innovations, the Medical Neuroscience specialization of the Biomedical Science Master is ideally suited for those who wish to bridge the gap between the fundamental neurobiology and clinical neurosciences.

Courses in the specialisation

Period	Code	Course
W36A	MED-BMS24	Medical Neuroscience: Conceptual basics and anatomy
W36B	MED-BMS32	Medical Neuroscience: molecular and cellular neuroscience
W40A	MED-BMS25	Medical Neuroscience: Functional imaging
W40B	MED-BMS30	Medical Neuroscience: Animal models for psychiatric and neurological disorders

Specialisation coordinator

My name is Nils Kohn. I am the specialisation coordinator for the Medical Neuroscience specialisation within the Biomedical Sciences Master (BMS).

I'm a faculty member at the department of Clinical Neuroscience of the Radboud University Medical Centre and the Donders Institute for Brain, Cognition and Behaviour. I am a psychologist by training and I conduct research in cognitive neuroimaging. My major focus in research is related to questions on how our emotions are consciously or unconsciously regulated, which motivational factors have an influence and whether regulatory principles transfer to other domains of human functioning, such as memory and executive functioning.



To investigate these constructs, I mainly use neuroimaging and psychophysiological measures in my research. Currently, important topics of interest to me are how emotion and self-control are implemented in the large-scale network structure of the brain and how this relates to nutrition, glucose metabolism, aggression and stress. These current research foci are applied or planned to be applied in psychiatric, public health and educational contexts.

I coordinate courses and teach in the Biomedical Sciences Master and Bachelor and the Cognitive Neuroscience Master here in Nijmegen. The courses mainly cover methodological basis of

neuroimaging techniques, but I also teach some more conceptual classes. I have an extensive network of clinical and scientific collaborators all across the world. Additionally, I have many contacts to former colleagues or friends in the biotech industry, policy making, data science and consultancy. I am happy to use these contacts to help each BMS master student to find the ideal topic and internship.

I am happy to guide you as a mentor through the Medical Neuroscience Specialisation and counsel you on your career plans in research, communication or consultancy.

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Specialisation Clinical Human Movement Sciences

The field of Clinical Human Movement Sciences (CHMS) has a strong multi-disciplinary character with topics like (exercise) physiology, (functional) anatomy, biomechanics, orthopaedics, neurosciences and rehabilitation; these form the basis of the specialisation. The specialisation CHMS is characterised by a strong patient-centred approach. Physical activity is important to stay healthy and is the best medicine for most patients. Hence, it is very important to keep patients active as good and as long as possible. Human movement has many facets that evoke questions about musculoskeletal functioning, effects of physical (in)activity, the neural control of movement, movement coordination, rehabilitation and tools and equipment to support movement. As such, CHMS is strongly involved in healthcare, but also in sports and aging, and is therefore intrinsically connected with important societal issues.

Together with course coordinators, six courses were chosen as basis for the specialisation CHMS. However, more courses are related to this specialisation and as a coordinator I would be happy to discuss these with you when you start creating your study programme.

Courses in the specialisation

Period	Code	Course
W36A	BMS53	Orthopaedic Biomechanics in Motion
W36B	BMS54	Applied exercise physiology
W40A	BMS55	From vascular function to vascular failure
W40B	BMS50	Neural control of movement
W44A	BMS49	Movement science in rehabilitation
W44B	BMS52	Disorders of movement

Specialisation coordinator

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With my background as Biomedical Scientist with a major in movement sciences and as an active athlete I have always been interested in human movement. Since 2016, I have been a mentor (of the RIHS) for master students. Before that, I was study leader 'Clinical Human Movement Sciences' for a period of five years in which a coaching task was combined with specialization-related tasks. I fulfilled both functions with great pleasure and am pleased to be the new specialisation coordinator of Clinical Human Movement Sciences.

As an associate professor 'onderwijs in beweging' I have a large local and national network in the field of movement sciences. I coordinate the research minor 'Moving questions' and the master course 'Orthopaedic Biomechanics in Motion' (BMS53). Furthermore, I am chairwoman of the national committee regarding Movement Sciences Programs together with the Universities of Maastricht (MU), Groningen (UMCG) and Amsterdam (VU). As a researcher my goal is to improve the prediction of fracture risk in patients with bone metastases by developing patient specific computer models.

Specialisation Drug Safety and Toxicology

The World Health Organisation (WHO) has ranked environmental exposures to chemicals among the most important risk factors for chronic disease mortality. Prescription of drugs also pose a major health risk, ranking 4th (with stroke) as a leading cause of death. The European Commission estimates that adverse reactions from prescription drugs cause 200,000 deaths every year.

For appropriate chemical risk management there is a great demand for trained toxicologists. In the past 15 years the Radboudumc has delivered more than 75 toxicologists that acquired important positions in university (45%), (pharmaceutical) industry (25%) and regulatory agencies (30%). Our graduates are highly appreciated for their in-depth drug safety and toxicological knowledge and broad skills in applied and fundamental biomedical research methods. The Radboudumc drug safety and toxicology specialisation is unique, because it is embedded in a medical faculty in the Netherlands, which gives us the opportunity to set up a series of courses that will be the standard in the human toxicology field. There are ample opportunities for our master's students to do internships at influential institutions in the Netherlands (e.g. NVIC, RIVM, TNO) and abroad. After their master's three quarters of our students that specialised in drug safety and toxicology have obtained a PhD. The Radboudumc is a key player in the education of toxicologists and this specialisation will merely strengthen this position.

At the Radboudumc we teach 6 Master courses that together form a firm basis for becoming a registered toxicologist. More information can be obtained at <http://www.pharmtox.nl/education/>

Courses in the specialisation

Period	Code	Course
W36A	MED-BMS64	Molecular and cellular toxicology
W36B	MED-BMS67	Chemical mutagenesis and carcinogenesis
W40A	MED-BMS63	Biodynamic and toxicokinetic modeling
W40B	MED-BMS66	Reproductive Epidemiology and Toxicology
W44A	MED-BMS65	Clinical toxicology
W44B	MED-BMS60	Human risk assessment

Specialisation coordinator

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As researcher and teacher of the department of Pharmacology and Toxicology I focus on molecular / biochemical toxicology and transport processes of drug molecules. As a coordinator of the specialization I have a much broader view on drug safety and toxicology. Coaching of students I enjoy very much and therefore I coordinate and participate different teaching activities, but also supervise many research projects. As a specialisation coordinator I like to guide and help students to get prepared for their next step.

Specialisation Health Technology Assessment

HTA involves **scientific research** to assess the consequences of employing **health care interventions**. It features a **broad approach**, including effectiveness research, economic analysis, patient outcome measurement, assessment of organizational consequences, and ethics. As such, it requires **interdisciplinary teamwork**. The ambition of HTA is to provide decision-makers at a macro-, meso-, and micro-level with information they need to improve health care. It is tightly interwoven with **clinical practice and health care policy**.

Therefore, it is **action oriented**, focusing not only on knowledge, but also on change. It has a strong client focus. Besides, HTA helps to understand the working mechanisms behind health care interventions and diseases. HTA entails a young and **dynamic** field of work, which leaves ample room for the most ambitious students, who wish to pay a **visible contribution to health care**.

They are found in a great variety of organizations worldwide: academic hospitals, pharmaceutical companies, advisory bodies to the government, research institutes, and consultants. Does that sound like **you**?

Courses in the specialisation

Period	Code	Course
W36A	MED-BMS58	Cost-effectiveness analysis in health care
W36B	MED-BMS56	Health outcome measurement
W40A	MED-BMS62	Advanced modelling in economic evaluation
W40B	MED-BMS61	Statistical modeling in medical research
W44A	MED-BMS48	Clinical trials
W48A	MED-BMS08	Qualitative research

Specialisation coordinator

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As a former student Biomedical Sciences with a major in Human Movement Sciences, I was seeking for a field of research where my research results would have a direct implication for decisions that are being made in health care. I found this in a second major 'Health Technology Assessment'. After graduation I worked on the utilization of expensive medicines in the field of rheumatology for my PhD degree.

Since 2013 I have been coaching students that choose a career in the field of HTA and helping them finding internships, choosing interesting and relevant courses, and setting a career path. For me personally, it is very satisfying to see students finding their own path and getting the best out of themselves during their Master.

Specialisation Molecular Medicine

Molecular medicine is a broad and important field, where biological, bioinformatics, chemical, and medical techniques are used to describe molecular structures and mechanisms, identify (fundamental) molecular and genetic errors of diseases, and to develop molecular interventions to correct these pathological conditions. The field develops ways to diagnose and treat disease by understanding the way genes, proteins, and other cellular molecules work. Molecular medicine is based on research that shows how certain genes, molecules, and cellular functions may become abnormal in diseases such as diabetes or cancer. The field aims to elucidate disease pathogenesis at the molecular level, which may lead to the design of specific tools for disease diagnosis, treatment, and also prevention.

Discoveries made today in the laboratory are translated at a rapid pace into new diagnostics and therapeutics. Therefore Molecular medicine is rapidly expanding and will have an increasing role in the future.

Molecular medicine provides contemporary insights into how the genetic and molecular revolution is influencing medical thinking and practice on a broad front including research approaches in medicine, innovative therapies but also many others as for instance forensic medicine.

Courses in the specialisation

Period	Code	Course
W36A	MED-BMS75	Advanced tools in molecular biology
W36B	MED-BMS40	Nanomedicine
W40A	MED-BMS43	From target to therapy
W40B	MED-BMS42	Targeting cellular processes to treat disease
W44A	MED-BMS39	Understanding proteins in 3D
W44B	MED-BMS37	Cell death in life and disease

Specialisation coordinator

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My name is Joost Hoenderop and I obtained my PhD in the year 2000. The focus of my PhD research was the molecular understanding of renal calcium handling. I have very good memories of my study and PhD project where we succeeded to elucidate new molecular mechanisms in patients with a disturbed mineral homeostasis. After gaining some international experience as a post.doc in Switzerland, these new insights fuelled my interest to establish an own research group at the Radboudumc. Nowadays, my group is based on a dynamic international team of 20 researchers consisting of Assistant professors, Post-docs, PhD students, technicians and students.

Over the last years, I have coached and supervised many Biomedical students. Based on my experiences I noticed that BMW students develop excellent skills, are ambitious, interested and prepared to continue their research activities in the form of a high-end biomedical profession. As a

principal investigator and teacher I am enthusiastic and feel responsible to support the MSc BMW students in their development as a professional.

As the Specialisation mentor Molecular Medicine I can connect you with a large network of researchers who are all fascinated by molecular research. I am housed in the Radboud Institute for Molecular Life Sciences, a modern building where most of the molecular research is embedded. It will be my pleasure to support you during your personalized BMW MSc programme.

Specialisation Epidemiology

Epidemiology is the study of the distribution (frequency, patterns) and determinants (causes, risk factors) of health and disease conditions in human populations. Epidemiology is the cornerstone of public health and applied medical research.

Comparing groups is the core of the scientific methods needed to solve research questions concerning health and disease. By comparing groups epidemiologists investigate causal relations and assess the efficacy of medical procedures for prevention, diagnosis and treatment. Although the name epidemiology is associated with epidemics of infectious diseases, all domains of medicine and public health rely on epidemiology. So epidemiologists also study diseases like cancer, dementia and diabetes and health-related conditions such as high blood pressure and obesity.

Within the specialization of epidemiology, you will learn how to perform population-based research, from study design, data collection and statistical analyses to interpretation and dissemination of results. The specialization includes six core courses. You can extend this with an epidemiological internship and elective courses to obtain a formal Epidemiologist-A registration by the Dutch Epidemiology Society (VvE – www.epidemiologie.nl)

Courses in the specialisation epidemiology

Period	Code	Course
W36-A	BMS77	Design of applied medical research
W36-B	BMS78	Modern methods of data collection
W40-A	BMS47	Biomarkers in population based research
W40-B	BMS61	Statistical modelling in medical research
W44-A	BMS81	Applied medical research and society
W44-B	BMS59	Prediction models and machine learning

Specialisation coordinator

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I am associate professor in epidemiology education. My background is a master in human nutrition and health (Wageningen University) and a PhD in clinical epidemiology (VU Amsterdam). My research focus areas are epidemiology, applied clinical research and public health research. I have a great interest in lifestyle (*nutrition, physical activity*) and prevention of diseases (*obesity, cancer, coronary heart disease and diabetes*).

I have been coaching students in the field of epidemiology for several years now. As I have a large (inter)national network in epidemiology, I can help finding internships and help students to organize their master Biomedical Sciences focusing on epidemiology.

Specialisation Immunology and Host Defence

The courses of this specialization focus on how our bodies defense system works, how it protects us and what happens if it fails or overreacts. The ultimate result of a failing or overreactive defense system is disease.

In the course “inflammatory diseases” we start with deepening our knowledge on basic immunology and exploring the use of that knowledge for research. For this purpose we are defining common pathways and essential molecules in immunology, and investigating how we can use cell culture and animal models to study inflammatory diseases. Also, which biomarkers are useful and reliable, and how do you design a clinical trial?

In the courses “targeting cellular processes to treat disease” and “target to therapy” we take things a step further and dive into the drug development pipeline. In “targeting cellular processes to treat disease” we will do this from a cellular perspective, focusing on classical small molecules, the newer biologics and the most recent cell-based therapeutics. In “target to therapy” we zoom out and go through the preclinical steps of the drug development pipeline focusing on a genetic target and a immunological target. This will cover several model systems for target identification and validation, and understanding the development of key assays to test and optimize a drug candidate. In addition, we will meet people from industry sharing their perspective on drug development.

Without cell death, life of multicellular organisms is impossible. Induced cell death is even crucial for embryonic development and immunity. Therefore in “cell death in life and disease” we will focus on the mechanisms of cell death and how they relate to life and disease. In this course we will gain a better understanding of the molecular and cellular biology principles involved in cell death and how these can be used to treat diseases, with a special attention to cancer.

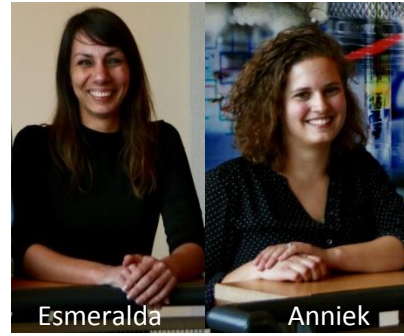
Finally, in “cancer development and immune defense” we will discuss the development of malignancies, with a focus on mutational evolution and epigenetic gene expression in acute myeloid leukemia . Next, we will focus on how the immune system can recognize and attack these malignant cells, and how this can be applied as different therapeutic strategies.

Courses in the specialisation

Period	Code	Course
W36B	MED-BMS74	Inflammatory diseases
W40A	MED-BMS43	From target to therapy
W40B	MED-BMS42	Targeting cellular processes to treat disease
W44A	MED-BMS72	Cancer development and immune defense
W44B	MED-BMS37	Cell death in life and disease

Specialisation coordinator

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Deputy specialisation coordinator

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Esmeralda Blaney Davidson started her career from a pathobiology perspective, but due to the immune systems intricate interaction with all other systems in the body, she gravitated more and more towards immunology. She is fascinated on the interplay between the central nervous system and the immune system and how this can affect pain. Esmeralda has been a student mentor since 2014, starting out by guiding students as a substitute major tutor in pathobiology. She has been a mentor for BMS ever since the new curriculum, to guide students to find their path in the BMS program and sometimes coach them in personal issues. She also has coached students during their bachelor BMW. Anniek van der Waart is the deputy Specialisation Coordinator, with a keen interest in immunology and cancer. The strength of the immune system to attack malignant cells motivates here to research new immune therapies against cancer. She has been a mentor for BMS for several years. Together Esmeralda and Anniek are an enthusiastic team that is looking forward to coach you in your BMS career.